Hazard Identification and Risk Analysis[1]

For Stark County, Ohio

Stark County Emergency Management Agency

[1] Special thanks to Ohio EMA for providing the initial data on which this report is built. Also, Stark EMA would like to thank Sandra Ridgeway-Williams for her tireless work on this project.

August 2010 Edition

Preface

Dear Reader,

The following is the Hazard Identification and Risk Analysis (HIRA) for Stark County, Ohio. This analysis incorporates the latest information and requirements available as well as past and historical events concerning hazards. This plan incorporates National Planning Scenarios, National Plan Review, catastrophic planning and the National Fire Protection Association Standard (NFPA) 1600 Standard.

Our intent by writing this document is to provide an overview of past incidents that have occurred in Stark County. The HIRA for Stark County is not meant to replace an evaluation of potential threats to any particular home, business, institution or piece of property. It provides a broad examination of what has and might occur in our county over the next few years. This document seeks to capture major events that have occurred in our county. Stark County needs to maintain a history of events that have occurred as those points of weakness and types of events that have already occurred to present similar challenges in the future. Or, as George Santayana has written, “Those who cannot remember the past are condemned to repeat it.”

The Hazard Identification and Risk Analysis for Stark County similarly looks to the horizon for new and emerging threats to the Stark County populace. We have used the comprehensive list of potential hazards from NFPA 1600. This list affords us the opportunity to ponder whether or not a potential hazard is likely to occur in our county.

In summary, this document is not a complete list of the only hazards that will occur in Stark County. This document is to be used to help Stark EMA in focusing its planning efforts on hazards that are more likely to occur than others. Its ability to predict future events is limited at best.

We hope this document is a benefit to other agencies in the county and their emergency planning efforts.

Sincerely,

Timothy L Warstler, Director

Stark County Emergency Management Agency

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1. INTRODUCTION

The Stark County Hazard Identification and Risk Assessment (HIRA) document is the first edition for Stark County, Ohio. This document was prepared by the Stark County Emergency Management Agency for use by local agency emergency preparedness officials.

The intent of this document is to be a useful tool for Stark County EMA partners to discuss hazards and vulnerability. The HIRA does not provide policy or action-based recommendations to manage hazards. This document is one element of a comprehensive emergency management program that incorporates mitigation, preparedness, response and recovery. Mitigation plans, the Stark County Emergency Operations Plan as well as standard operating procedures round-out a comprehensive program to manage hazards.

Emergency Management in Stark County, Ohio is governed by Ohio Revised Code (ORC) 5502.21-.22 which mandates that the EMA, a division of the Department of Public Safety, is the primary coordinating agency for countywide emergency readiness activities to meet the threats posed by various hazards.[i] In cooperation with other state offices and agencies, the agency has developed this analysis of the primary hazards that may threaten both lives and property.

For the purpose of this HIRA, we will use the ORC explanation of hazard. The ORC 5502.21 states *Hazards* mean "…any actual or imminent threat to the survival or overall health, safety, or welfare of the civilian population that is caused by any natural, human-made, or technological event."[ii]

As defined by the ORC, *Hazard identification* means "…an identification, historical analysis, inventory, or spatial distribution of risks that could affect a specific geographical area and that would cause a threat to the survival, health, safety, or welfare of the civilian population, the property of that population, or the environment."[iii]

The National Fire Protection Association (NFPA) Standard 1600 requires entities to "identify hazards, monitor those hazards, the likelihood of their occurrence, the vulnerability of people, property and the environment, and the entity itself to those hazards"[iv] as part of the risk assessment process.

This analysis does not offer solutions to hazard-related problems. It is intended, however to assist readers in attaining a better understanding of hazards and their effects. A brief outline and overview of these hazards will help to illustrate their magnitude.

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[i] See Ohio Revised Code 5502.22 accessed at http://onlinedocs.andersonpublishing.com/oh/lpExt.dll/PORC/245eb/24748/2478c/24792?fn=document-

[ii] See Ohio Revised Code 5502.21 (I) accessed at http://onlinedocs.andersonpublishing.com/oh/lpExt.dll/PORC/245eb/24748/2478c/2478d?

[iii] See Ohio Revised Code 5502.21 (J) accessed at http://onlinedocs.andersonpublishing.com/oh/lpExt.dll/PORC/245eb/24748/2478c/2478d?

[iv] See National Fire Protection Association. NFPA 1600: Standard on Disaster/Emergency Management and Business Continuity Programs, 2007 Edition, Pp. 1600-5

A General Overview of Hazards in Stark County, Ohio

Upon reviewing the literature, twenty-three hazards were identified for Stark County. These hazards include those listed in NFPA 1600, the 15 National Planning Scenarios, the National Plan Review, a report produced for Ohio EMA by URS, and Ohio EMA's Enhanced Mitigation Plan. To help simplify the hazards, three major groups have been created to categorize the hazards based on the categories recommended in NFPA 1600. The categories are Natural Hazards/Events, Human Caused Hazards/Events and Technological Hazards/Events as shown in Figure 1 (on page 7). Each of the hazards identified are not mutually exclusive. Therefore, the hazards are further grouped into seventeen groups of hazards below the three categories. Please see a comprehensive list of hazards on the next page.

As illustrated in Figure 2 (Page 8), the most damaging hazards/events are floods and tornadoes, which (with total costs combined) inflicted over $114.7 million in losses over the years in Stark County. Other severe weather events, such as winter storms, have also led to floods or costly recovery actions. Drought has also led to agricultural losses and forced water users to seek assistance during these sustained periods of insufficient precipitation.

Activities associated with mankind also have their effects:

- Woodland and field fires show a need to reduce this costly resource depletion.
- Mine closings have led to issues related to subsidence and landslides. From the 1940s until the present, closings were made without actions to prevent shaft collapses. Urban expansion, or new highway construction, has led to damages related to these collapses.
- Class I and other earthen dams also pose a potential threat to adjacent, or downstream, communities (although not to the extent of floods or tornadoes). Many of these dams serve as up-ground reservoirs or recreational sites. If not properly built or maintained, they may fail, leading to downstream flooding and strained response capabilities.

Over 50 years, the "technical dependency" of the county, state and nation has become a fact of life. The increased use of synthetics has led to both storage and disposal problems. HAZMAT incidents remain as the most common form of technological threat to Ohio, occurring almost daily.

Civil disorder (e.g. riots or acts of terrorism) tends to follow economic or social trends and has not often had origins or causes in Ohio or Stark County. The World Trade Center and Oklahoma City bombings in the 1990s led to the creation of a state-level Inter-Agency Coordinating Group, to address the threat and responses to use of Weapons of Mass Destruction (WMD). Civil disorder could affect Stark County, but would probably be limited to larger cities (i.e. Canton, Massillon and Alliance) and may occur at any time. The past incidents in other areas have emerged from strikes and public demonstrations.

Figure 1: Hazards Identified

NATURAL HAZARDS/EVENTS:	HUMAN-CAUSED HAZARDS/EVENTS:
Earthquake/Seismic Activity Earthquake **Subsidence/Landslide** Landslides Land Subsidence **Fire** Wildfires (Forest, Range, Urban) **Floods** Floods (Including Flash flooding) **Severe Winter Weather** Winter Weather (Sever Snow/Ice/Sleet) Extreme Cold **Tornado/Severe Storms** Hail Thunderstorms Tornado Lightning Strikes Windstorm **Drought** Drought Extreme Heat Famine **Dam Failure** Water Control Structure (Dam/Levee Failures) **Not Analyzed for HIRA** Animal Infestation/Damage Glacier Coastal Erosion* Expansive Soils* Tsunami Volcano Iceberg Dust/Sand Storm Geomagnetic Storm Storm Surge Hurricane Avalanches *Not explicitly listed in NFPA 1600 *Source: Ohio EMA HIRA*	**Terrorism—Biological Attack** Aerosol Anthrax* Plague* Foreign Animal Disease (Foot and Mouth Disease)* **Terrorism—Non-Nuclear/Biological/Chemical** Civil Disturbances (Riots, Hate Groups) Explosives Attack/Bombing **Biological** Epidemic (Plague, Pan Flu, etc.) Insect Infestations **Not Analyzed for HIRA** Air/Water Pollution, Contamination Financial Issues, Economic Depression, Inflation Communication Systems Interruptions Building Collapse Transportation Emergency (Non-Hazardous Material, including air and rail events) Fuel/Resource Shortage Explosion/Fire Enemy Attack/War Insurrection Disinformation Physical or Information Security Breach Misinformation TECHNOLOGICAL HAZARDS/EVENTS: **Hazardous Materials** Hazardous Materials Solid Waste Disposal Problems **Power Failure** Energy/Power/Utility Failure (Including the Department of Energy) **Radiological Incident** Radiological Incidents Nuclear Power Generating Facilities* **Terrorism** Nuclear/Chemical/Biological Attacks **Transportation Incidents** Chlorine Tank Explosion **Terrorism—Dirty Bomb** Radiological Dispersal Devices* **Not Analyzed for HIRA** Electromagnetic Pulse

Figure 2: Stark County Weather Events (1950-2010)

Weather Type	Total	Highest Magnitude	Highest # of Deaths	Highest # of Injuries	Highest Amount of Property Damage	Highest Amount of Crop Damage
Thunderstorm Winds	233	83kts. 06/24/2004 Canal Fulton	1 06/22/2006 Countywide	1 04/13/1994 Canton 07/09/1999 06/22/2006 Countywide	1.2M 06/22/2006 Countywide	25K 07/21/2003 Crystal Springs
High Winds	34	69kts 10/30/1996 30 Counties	2 03/06/2002 Stark Co.	8 03/09/2002 Stark Co.	8.9M 03/09/2002 28 Counties	2.3M 10/30/1996 Stark Co.
Strong Winds	9	45kts. 05/11/2003 Stark Co.	0	0	1.2M 05/11/2003 28 Counties	0
Hail	163	2.75in. 04/09/2001 N. Industry 05/17/2004 Stark Co.	0	1 04/09/2001 Navarre	30M 07/26/2008 Reedurban	50K 09/25/1994 Stark Co.
Tornado/ Funnel Clouds	11	F2 11/16/1965 04/28/2002 Stark Co.	2 11/16/1965 Stark Co.	9 11/16/1965 Stark Co.	45.5M 04/28/2002 Crystal Springs	0
Extreme Cold	9	N/A	4 01/10/1997 30 Counties	1 12/09/1995 Statewide	3.4M 02/02/1996 30 Counties	0
Ice Storm	7	N/A	0	14 03/09/1994 18 S & E Counties	124.9M 01/05/2005 28 Counties	500K 02/08/1994 23 North & Central Counties
Heavy Snow	8	N/A	0	0	3.5M 03/16/2004 15 Counties	0
Winter Storm	17	N/A	0	56 01/02/1999 28 Counties	750M 03/07/2008 3 Counties	0
Blizzard	1	N/A	1 12/19/1995 25 N. Counties	0	800K 12/19/1995 25 N. Counties	0
Flash Flood	34	N/A	2 06/25/1995 Countywide	0	52M 07/27/2003 Countywide	250K 06/22/2006 S. Stark Co.
Flood	20	N/A	0	0	4.8M 01/01/1997 Countywide	20K 06/01/1997 Countywide
Lightening	20	N/A	0	1 09/12/1995 Canton 05/29/2001 07/26/2005 N. Canton	175K 07/14/2000 N. Canton	0
Heat Wave/ Drought	12	N/A	13 08/08/1995 32 Northern Counties	52 08/08/1995 32 Northern Counties	600K 07/12/1995 32 Northern Counties	200M 09/01/1999 28 Counties
Heavy Rain	2	N/A	0	0	0	0

Crop Damage (Due to excess rainfall & low temp)	1	N/A	0	0	0	34.5K 05/01/1997 Countywide

Source: NOAA Satellite and Information Center National Climatic Data Center

Since 1964, nine major emergency events have received a Presidential Declaration of Disaster. As a result, Stark County has received a portion of over $5.14 million in federal assistance monies. The EMA has assisted both the public and private sectors in obtaining this assistance. Figure 3 below shows the disaster declarations in which Stark County was included.

Figure 3: Stark County-Included Presidential Major & Emergency Disaster Declarations (1964-2007)

Disaster Declaration Number	Date Declared	Federal Disaster Programs	Incident Type	Other Counties included in the Declaration	Funds Provided
DR-266	15-Jul-69	PA	Heavy rains and flooding	Ashland, Ashtabula, Coshocton, Cuyahoga, Erie, Harrison, Holmes, Huron, Lake, Lorain, Lucas, Medina, Morgan, Muskingum, Ottawa, Richland, Sandusky, Seneca, **Stark**, Trumbull, Tuscarawas, Wayne, Wood	$1,000,000 (P)
DR-3055-EM	26-Jan-78	PA	Severe blizzard conditions	All 88 counties	$3,546,669 (P)
DR-1484*	1-Aug-03	IA/PA/MIT	Severe storms, tornadoes and flooding	Carroll, Columbiana, Cuyahoga, Franklin, Jefferson, Mahoning, Medina, Portage, Richland, Stark, Summit and Trumbull (IA/MIT); Adams, Columbiana, Carroll, Jefferson, Mahoning, Medina, Monroe, Portage, **Stark**, Summit, Trumbull and Vinton (PA)	$135,723,395 (I) $13,160,834 (P)* $6,016,488 (M) $162,790 (S)-
DR-1519*	3-Jun-04	IA/PA/MIT	Severe storms and flooding	Athens, Carroll, Columbiana, Cuyahoga, Delaware, Guernsey, Harrison, Hocking, Holmes, Medina, Noble, Perry, Portage, Summit and Tuscarawas (IA/PA/MIT); Crawford, Geauga, Licking, Logan, Lorain, Mahoning, Richland and **Stark** (IA/MIT) and Knox and Jefferson (PA/MIT)	$30,238,921 (I)* $14,00,750 (P)* $2,305,560 (M) $748,426 (S)-
DR-1556*	19-Sep-04	IA/PA/MIT	Severe storms and flooding	Athens, Belmont, Carroll, Columbiana, Gallia, Guernsey, Harrison, Jefferson, Meigs, Monroe, Morgan, Muskingum, Noble, Perry, Tuscarawas, Vinton and Washington (IA/PA/MIT); Lawrence, Mahoning, **Stark** and Trumbull (IA/MIT)	$47,455,690 (I) $35,597,480 (P)* $3,948,349 (M)* $2,300,000 (S)
DR-1580	15-Feb-05	IA/PA/MIT	Severe winter storms, ice and mudslides	Clark, Sandusky, Warren and Miami (IA/MIT); Ashland, Auglaize, Athens, Belmont, Coshocton, Crawford, Delaware, Fairfield, Franklin, Guernsey, Henry, Hocking, Holmes, Huron, Jefferson, Licking, Logan, Morgan, Muskingum, Pickaway, Pike, Richland, Ross, Scioto, **Stark**, Tuscarawas, Washington, and Wyandot (IA/PA/MIT); Adams, Allen, Brown, Carroll, Champaign, Clermont, Columbiana, Darke, Fayette, Hancock, Hardin, Harrison, Highland, Know, Lorain, Marion, Median, Meigs, Mercer, Monroe, Montgomery, Morrow, Noble, Paulding, Perry, Putnam, Seneca, Shelby, Union, Van Wert and Wayne (PA/MIT)	$13,823,757 (I)* $123,935,836(P)* $7,534,746(M)* $1,500,000 (S)-
EM-3250	13-Sep-05	PA	Hurr. Katrina Emerg. Shelter Operations	All 88 Counties were included in the federal declaration	$2,499,103 (P)*
DR-1651	2-Jul-06	IA/MIT	Severe storms and flooding	Cuyahoga, Erie, Huron, Lucas, Sandusky and **Stark**	$25,001,761 (I)* $1,798,019 (M) $593,090 (S)

HMGP first available with disaster declared after 1987.
(P) - Public Assistance (S) - State Match to Federal Hazard Mitigation funds (M) - Hazard Mitigation Grant
(I) - Individual Assistance includes FEMA Disaster Housing, SBA loans for homes, personal property and businesses and FEMA/State Other Needs Assistance grants for families and individuals
*Indicates the disaster is not officially closed.
Information updated as of May 12, 2010. Information retrieved from State of Ohio Disaster History (1964-2007)

Source: Ohio EMA (PIO/DRB Files)

Although hazards may either decrease, or increase, from a strictly numerical standpoint, inflationary labor and material trends have caused overall recovery costs to rise. Each new event is more costly to the county, state and nation than its predecessors.

Stark County, Ohio Profile

Stark County is vulnerable to some form of natural, technological or other hazard. The effects of these (regardless of type or size) upon the county may vary due to differences in climate, geography, or land use. A better understanding of both hazards and associated risks may be obtained by a brief examination of the characteristics of the county.

Geography and Climate

Stark County is located in northeastern Ohio, approximately fifty miles south of Cleveland. Stark County covers 579.4 square miles, ranking eleventh in area of the eighty-eight counties in Ohio. Stark County is bounded on the north by Summit and Portage counties; east by Mahoning and Columbiana counties; south by Carroll and Tuscarawas counties; and west by Holmes and Wayne counties.

The United States Census Bureau shows Stark County, Ohio has a population of approximately 387,116. The population exceeds 400,000 during the Professional Football Hall of Fame Festival and several other events each year.

Topographically, the Stark County is in the Appalachian Plateau Physiographic Province. The northern two-thirds of the County are located in the glacial part of the Appalachian Plateau, and the rest of the County is unglaciated. Elevations range from a little less than 900 feet above sea level to about 1,350 feet above sea level. The topography of the unglaciated portion of the County is hilly and steep and variations in relief average about 200 feet within one-half mile. The glaciated part of the County is undulating and rolling, with an average relief varying less than 100 feet within a mile.

Stark County possesses a continental climate ranging through the year from cold, damp winters to warm, humid summers with prevailing westerly wind patterns. Annual temperature ranges vary from an average of 37.0 degrees F to an average of 82.4 degrees F in July. Average annual precipitation, both rain and snow, is 36.8 inches overall.

The Economy of Stark County, Ohio (including transportation)

Stark County has an economy based mainly upon trade, manufacturing, service, government and finance (See figure 4). The annual mean family income is $39, 824. Out of the over 177,000 working residents of Stark County, almost twenty-one percent (20.7) of them commute out of the county to work. Nearly seventeen percent (16.9) of Stark County workers commute in from surrounding counties, averaging a commute time of twenty-one minutes.

Figure 4: Major Employers in Stark County

MAJOR EMPLOYERS	TYPE
Aultman Hospital	***Service***
Canton City Board of Education	***Government***
Fisher Food, Inc.	***Trade***
General Electric Co.	***Finance***
Mercy Medical Center	***Service***
Precision Cast Parts Corp.	***Manufacturing***
Republic Engineered Products	***Manufacturing***
Timken Company	***Manufacturing***
Wal-Mart Stores, Inc.	***Trade***

Source: Ohio Department of Development, 2007

Passing through and inside Stark County, there are 21 state highways, covering 232 miles; four national highways, covering 72 miles; and one Interstate highway, covering 19 miles.

Stark County contains a foreign trade zone, Foreign Trade Zone #181, which includes over eight hundred acres of prime commercial/industrial sites. Some of the benefits to being in a foreign trade zone include improved cash flow, reduced, deferred or eliminated customs duties or tariffs, quota avoidance and flexibility in disposition of returned or defective goods.

There are three railroads in Stark County, two Class I railroads and one Regional, listed respectively: CSX Transportation Inc. (CSXT); Norfolk Southern Corporation (NS); and the Wheeling & Lake Erie Railway Co. These railroads transport raw materials as well as finished products. Passenger transportation is provided by AMTRAK.

For almost 200 years, Stark County, Ohio has experienced disasters varying in origins and effects. Some of the more noteworthy of these which resulted in loss of life or economic damages are listed in Figure 5.

Figure 5: Historical Events and Hazards

NAME OF DISASTER	YEAR	HAZARD/EVENT TYPE	LOCATION	CASUALTIES
Cholera Epidemic	1849-50	Biological/Epidemiological	Statewide	5,000+
Influenza Epidemic	1918	Biological/Epidemiological	Statewide	Multiple Thousands
Winter Flood	1937	Flood	Statewide	250
Blizzard	1950	Winter Storm	Statewide	Unknown
Winter/Spring Floods	1959	Flood	Statewide	Unknown
Blizzard	1978	Winter Storm	Statewide	51
Winter Storms	2004-05	Severe Winter Weather	Statewide	Unknown

Source: Ohio Almanac/Contributing Agencies/Ohio EMA (Plans)

These incidents have affected both people and property. Gubernatorial Declarations for Stark County, Ohio (Figure 6) have often been issued for a number of other events, not qualifying for federal assistance via Presidential Declarations, as “Emergencies” or “Disasters”. This process served to initiate coordinated state response efforts for areas requiring assistance beyond local capabilities. The total number of Gubernatorial Declarations for all the counties of Ohio (1987-2001) is 41.

Figure 6: Gubernatorial Declarations of Emergency in Stark County, Ohio

INCIDENT	DATE	AFFECTED AREA
Drought w/Burning Ban	31-Oct-91	Statewide
Drought (Burning Ban Rescinded)	2-Nov-91	Statewide

Source: Ohio EMA (Mitigation/PIO/DRB Files)

RISK ASSESSMENT, THE ANALYSIS PROCESS (METHODOLOGY, FACTORS AND VALUES)

A hazard analysis consists of two elements: the identification of a hazard (with related threats to life and property) and an assessment of the risks associated with that hazard. Research for this analysis involved the collection of both historical and statistical data, including interviews with professionals in various disciplines. Information was then systematically analyzed for potential risk value. The risks associated with each hazard were further assessed using eight factors with numerical risk values. These nine factors are: ***Past Declarations***, ***Historical Occurrence, Magnitude, Frequency, Warning Time, Demographic Factors, Fiscal Effects, Duration, and Response/Recovery Time***. Numerical values were applied to provide a basis on which to compare assigned weights among hazards and assigned risks. Factor value totals were then added, allowing hazards to be compared against each other to obtain final rankings.

Past Declarations

All research has indicated the frequency with which events have occurred. Some have been fairly frequent in this county while others were only sporadic. Rankings are 1, 2, 3, 4, or 5.

1	2	3	4	5
None	**Low**	**Medium**	**High**	**Excessive**

Historical Occurrences

If a hazard/event occurred from one to five times within a ten-year period, it has a Low Probability of occurrence. If occurred up to ten times within 10 years, it has a Medium Probability. If the hazard was encountered more than ten times in 10 years it has a High Probability. If the hazard occurred ten or more times within a year, it receives an Excessive Probability rating. Rankings are 1, 2, 3, 4, or 5.

1	2	3	4	5
None	**Low**	**Medium**	**High**	**Excessive**

Magnitude (Impact)

Magnitude refers to the number of lives (population) affected. It also includes the type of area in which the hazard has affected. This affected area may range from a Single Site, in which a village, farm, or road junction in the county is affected; Multiple Sites, when one or more single sites are affected; Small Area, where a whole city or

grouping of cities in the county are affected; to a Large Area, where the entire county and surrounding counties are affected. Ranking are 1, 2, 3, or 4.

1	2	3	4
Negligible	**Limited**	**Critical**	**Catastrophic**
Single Site	**Multiple Sites**	**Small Area**	**Large Area**

Frequency

Frequency relates to the chance or possibility of a specific hazard occurring. No Possibility is any percentage from 0-24 percent of the hazard occurring; Some Possibility of a hazard occurring is 25-50 percent; Greater Possibility of a hazard occurring is 51-75 percent; and a High Possibility of a hazard occurring is 76-100 percent. Rankings are 2, 4, 6, or 8.

2	4	6	8
No Possibility	**Some Possibility**	**Greater Possibility**	**High Possibility**
0-24%	**25-50%**	**51-75%**	**76-100%**

Warning Time

Warning Time may affect both the demographic and fiscal factors of a hazard. The lead-time required protecting lives and property varies greatly with each event. For instance, a winter storm may develop so slowly that there is time to alert crews and emplace plows, but flash floods can occur with no warning. Rankings are 1, 2, 3, or 4.

1	2	3	4
Extended	**Medium**	**Short**	**Short-None**
(Over 60 Minutes)	**(31-60 Minutes)**	**(15-30 Minutes)**	**(Under l5 Minutes)**

Demographic Factor

The Demographic Factor refers to the effects upon a populace; casualties via deaths or injuries that can be expected from a given event. The Shadyside Flood of l990 was a powerful flash flood (with mudslides) that occurred in an area without a warning system, resulting in 33 deaths. Other types of floods (as on the Ohio River) may develop slowly, allowing more warning time and. thus, few, or no, casualties. Rankings are 2, 4, 6, or 8.

2	4	6	8
No Casualties	**Low (1-5)**	**Medium (6-10)**	**High (10+)**

Fiscal Effects

Fiscal Effects relate to the monetary losses suffered in an event. This factor can vary between jurisdictions based on economic, geographic, demographic, and legal considerations. Subdivisions that consistently enforce floodplain regulations are less likely to incur severe fiscal losses than those permitting construction in floodplains. Rankings are 2, 4, 6, or 8.

2	**4**	**6**	**8**
Minimum	Low	Medium	High
($0-10,000)	**($10-50,000)**	**($50,001-100,000)**	**(Over $100,000)**

Duration

Duration may be defined as "time on the ground" or that time period when a hazard, or event, is actively present and causing damage. A HAZMAT spill may last a few minutes or a flood for a week. Duration, therefore, may not always be indicative of the degree of damage but it remains a factor. Rankings are 1, 2, 3, or 4.

1	**2**	**3**	**4**
Minimal	Short	Medium	Long
(Up to l Hour)	**(1-2 Hours)**	**(13 Hours – 1 Week)**	**(Over 1 Week)**

Response/Recovery Time

Response Time refers to the time the local agencies respond to the hazard and how quickly they progress into Recovery. The type of event and its severity will determine how long the recovery may take. Some events take years to recover. Rankings are 2, 4, 6, or 8.

2	**4**	**6**	**8**
Low	**Medium**	**High**	**Extreme**

In some areas, figures shown in this analysis may appear to conflict with other data. Information relating to tornado frequencies may, for example, reflect a greater or lesser total number of events than that cited in annual weather safety programs. This apparent discrepancy is based on the fact that the source of the data, the National Weather Service, uses two separate databases, one listing each tornado with multiple touchdowns as one event; while another base counts single tornado touchdowns at several points as multiple tornado events. See Figure 7 for the breakdown of eight of the nine factors.

Figure 7: Factor/Value Overview

HISTORICAL OCCURRENCES		**DEMOGRAPHIC FACTOR**	
Low Probability	5 events within 5-10 yrs	No Casualties	0 Injuries/Deaths
Medium Probability	10 events within 5-10 yrs	Low	1 to 5
High Probability	10+ events within 5-10 yrs	Medium	6 to 10

Excessive Probability	10+ events within 1 year		
MAGNITUDE		**FISCAL EFFECTS**	
Negligible/Single Site	Village, Farm, Road Junct	Minimum Losses	$0-$10,000
Limited/Multiple Sites	1+ of the above	Low Losses	$10,000-$50,000
Critical/Small Area	Whole cities or grouping of cities up to 5 or 10	Medium Losses	$50,000-$100,000
Catastrophic/Large Area	Whole county and surrounding counties	High Dollar Losses	$100,000+
DURATION		**FREQUENCY**	
Minimal	Up to 1 Hour	No Possibility	0%
Short	1-12 Hours	Some Possibility	25-50%
Medium	13 Hours to 1 Week	Greater Possibility	51-75%
Long	Over 1 Week	High Possibility	76-100%
RESPONSE TIME		**WARNING TIME**	
Low	Less than 24 Hours	Short/None	Less than 15 Min
Medium	1-5 Days	Short Time	15-30 Minutes
High	6-10 Days	Medium Time	31-60 Minutes
Extreme	10+ Days	Extended Time	60+ Minutes
RECOVERY			
The event will govern the amount of time for recovery. Some recovery may take years.			

A County Example

"Sample" County officials, in conducting a hazard analysis, are studying the tornado hazard for the county. By use of this example, we can see how the process may be applied to one county.

There were five tornadoes in the county in the last 10 years. *Historical Occurrence* receives a 2. *Magnitude* is given a value of 2 as research indicated that the tornadoes only occurred at single or multiple sites. *Frequency* is possible, but not likely, so it has a value of 4. The siren system can usually give a 5-15 minute W*arning Time* so that factor receives an 8. The *Demographic Factor* rated an 8 as the county's many trailer parks incurred casualties in the past. *Fiscal Effects* have ranged from $10,000-$50,000 and rate a 4. The time tornadoes spent on the ground has never exceeded 30 min., so *Duration* receives a value of 2. Local response forces work quickly but recovery from a tornado always goes over l0 days so the assigned value for *Response/Recovery Time* is 8.

An extracted overview for the **Tornado Hazard** in Sample County indicated the following:

Historical Occurrence	2
Magnitude	2
Frequency	4
Warning Time	8
Demographic Factor	8
Fiscal Effects	4
Duration	2
Response/Recovery	8
Total Hazard Value =	**38**

The total **Hazard Value** for tornadoes in our county is **38** which, as seen in the sample calculation above was determined by adding the values of all eight threat factors.

Once a total numerical threat value is derived for each of the hazards affecting a county, the numbers are then ranked, in order, from highest to lowest values (most to least threatening hazards). Annual emergency management goals and objectives, to include plans and training, for a county should be based on this ranking. Thus, if floods pose the greatest threat, readiness actions should address flooding first. Other hazards should not be excluded; and as projects are completed, or event frequencies change, all hazards should be subject to periodic re-evaluation (Ref: Ch. 3, below).

3. HAZARD ANALYSIS AND RISK ASSESSMENT AND DETAILED HAZARD OVERVIEW

The analysis process discussed in the previous chapter was applied to the entire state employing the historical data described in Chapter I. A numerical rating value was developed for each factor (Figure 6). Since the analysis incorporates data applicable to the entire state, the data for any specific (county) jurisdiction may differ.

Figure 8: Hazard Summary (Ranking by Factor Values)

ANALYSIS FACTORS / HAZARD TYPE	HISTORICAL OCCURRENCES	MAGNITUDE	FREQUENCY	WARNING TIME	DEMOGRAPHIC FACTOR	FISCAL EFFECTS	DURATION	RESPONSE/RECOVERY	TOTAL
NATURAL:									
Floods	4	4	6	1	8	6	3	8	**40**
Tornado/Severe Storms	5	3	8	2	8	4	1	8	**39**
Subsidence/Landslides	1/3	1/1	4/4	2/3	2/2	4/4	3/3	6/8	**23/28**
Winter Storms	3	4	2	1	4	4	3	4	**25**
Drought	1	4	2	1	2	2	2	6	**20**
Dam Failure	2	1	4	1	2	4	3	2	**19**
Earthquake/Seismic Activity	2	2	2	4	2	2	1	4	**19**
Wildfires	2	1	4	1	2	2	3	2	**17**
TECHNOLOGICAL:									
Hazardous Material	5	1	4	4	4	4	1	4	**27**
Transportation Incidents	2	1	4	4	6	4	2	2	**25**
Solid Waste Disposal	1	1	4	3	2	2	2	8	**23**
Nuclear Attack	2	2	4	4	4	2	1	2	**21**
Radiological Incidents	3	1	2	3	2	2	1	4	**18**
Department of Energy Facilities	1	1	2	3	2	2	1	6	**18**

HUMAN-CAUSED HAZARDS:									
Civil Disturbances	1	2	4	2	6	4	3	4	**26**
Infestations	3	2	4	1	2	4	4	4	**24**
Epidemic	1	2	2	1	4	2	4	2	**16**

These hazards, grouped according to primary type (Natural, Technological and Other), were then subjected to a detailed evaluation and discussion which appears on the following pages.

Natural Hazards

Floods

Floods (Hazard Rating = **40**), with the highest numerical rating, are the primary natural disaster threat to life and property in Stark County, Ohio. Although often confined to specific drainage systems or geographic regions, floods have affected 12 of Stark County's 36 political subdivisions, which is the equivalent to 80,000-85,000 people in the county. Protective actions (evacuation/sheltering) may deplete both material and fiscal resources. Flood waters have also damaged key infrastructure elements (roads, bridges and sanitary facilities). Infrastructure damages may also lead to an increase in infectious diseases in some affected areas. Other collateral problems include power outages and transportation delays.

Stark County has had 4 Presidential Declared disasters with over 30 million dollars in damages in just the past few years. The last declaration in which the county was included was July 2, 2006 for severe storms and flooding in the area. See Figure 2 for the most significant amounts of property and crop damage reported between 1950 and 2010. Fortunately, there have not been any reports of injuries or deaths from the flooding in the county.

Stark County can experience three types of floods: *Riverine* (The overflow of rivers and streams from rains or melt water); *Flash* (A fast rising of streams or "dry-gulch" waters after heavy rain/snowmelt); *Urban and Small Stream* (An overflow of storm sewers and streams after a heavy rainfall); and *Coastal* (Floods along the Lake Erie shoreline, often associated with severe storms).

Tornadoes and Severe Storms

Tornadoes (Hazard Rating = **39**) are the second greatest natural threat to the county. These violent, rotary windstorms can attain speeds up to 300+ mph and are often accompanied, or followed, by severe thunderstorms. They may occur anywhere at any time of the year, but are most likely to occur from February to November with unpredictable, severe effects.

One or more tornadoes are spotted annually in Stark County. Tornadoes have caused complete structural damage in Stark County with at least two deaths. This is of particular concern for outdoor activities and temporary structures that have not been secured (bleachers, bandstands, audio speakers, etc.). The estimated population at is 108,000.

Other severe storms, not officially classed as tornadoes, may be almost as violent and damaging. The potential for loss of life and property is high, coupled with an ability to overwhelm most response capabilities. Effects vary

according to wind speed, duration on the ground, and topography. As in the case of floods, recovery costs and times may extend over years.

The strongest tornado to hit Stark County was an F2 tornado which occurred November 16, 1965, when it killed two and injured nine. Another F2 tornado struck April 28, 2002, causing 45.5 million dollars in property damage. This information may also be found in Figure 2.

Winter Storms

Winter Storms (Hazard Rating = **25**) are the third leading weather-related threat to the county. These include heavy snowfall with extreme cold, ice or blizzard conditions, or any combination of the four.

From 1950 to the present, forty-two winter storms and/or major events listed in the previous paragraph have affected Stark County. See Figure 2 for the most damaging winter storms. Stark County's historical data shows the county does experience severe winters including instances where public shelters had to be opened to provide protection to the citizens. Stark County has been the victim of a paralyzing winter storm necessitation the suspension of normal activities and requiring the sheltering of persons without natural gas and or electric service.

In addition to structural and power line damages, these storms have a potential for collateral effects, isolation and economic disruption (from roadway and business closings) along with ice dams and floods caused by the melting process.

The estimated population at risk during a winter storm is 200,000. See Figure 2 for significant winter storm data.

Subsidence and Landslides

Subsidence and Landslides (Hazard Rating = **23-28**) are the next major natural threat. There has been an average of 46 *Mine Subsidence* events annually over an eight year period with an estimated 237 annual *Landslides.*

Subsidence is defined as a drop in the earth's surface due to a collapse in bedrock or other underlying material (coal pillars, rock, etc) into underground mines or other open space. There are two types of subsidence: a pit (sinkhole), which is the abrupt sinking of the ground surface, resulting in a craterlike pattern; and a sag or trough, which is the gradual settling of a surface. A sag may fill with water, but generally a pit will not because the water is draining into the mine underneath.

Land or Mudslides are defined as downward and outward movements of slopes due to rains or melting snow with accompanying damage and debris deposition. They may also include sudden collapses of mines, tunnel walls, or supports with resulting damage to surface structures or features (buildings and highways).

Landslides include three types. A *Rotational Slump* occurs when weak rock or sediment moves as a mass in a slow or imperceptible movement. A more common event, *Earth flow*, involves rock, sediment, or weathered surface materials moving down slope in a mass. *Rock fall* is seen as the most common and dangerous form of movement. Rock from a cliff or cut will fall onto roadways or structures. This action is common during periods of late winter or early spring thawing. Traffic vibration, undercut slopes, increased weight on slopes, or the removal of vegetation and ensuing erosion may also contribute to these events.

There are an incalculable number of abandoned coal mines in Stark County. From time to time, lawns and houses have collapsed because of these mines. So far, these incidents have been experienced primarily in the Market Heights section of the City of Canton and parts of Plain Township. While the Emergency Management Agency has Ohio Department of Natural Resources maps showing the locations of known mining activity, there are many other mining operations which were never charted. The state of Ohio, as a whole, has had subsidence problems dating back to 1923.

During and after WWII, when the demand for mineral resources was high, the state had over 700 active coal mines. As the supply of coal in many mines was exhausted the mines were abandoned with little, or no, preparation. Supporting pillars of coal in shaft mines were mined away prior to closings. In the mid-1990s over 6,000 closed underground mines were estimated to exist in 37 counties with over 61,000 acres of land affected by closings or site abandonment. Abandoned mines have also occasionally collapsed with damage to surface structures (e.g.: Interstate 70 in Guernsey County) or costly infrastructure damage. Subsidence and landslides, particularly during the l997 - 98 floods, have also led to the temporary relocation of farmsteads, housing units, or businesses. The estimated population at risk is 150.

Stark County is included in the twenty-six counties of Ohio which are mandated by the Ohio Mine Subsidence Insurance Law for basic homeowners to carry mine subsidence coverage.

Drought

Drought (Hazard Rating = **20**) is a prolonged period of abnormally dry weather. The lack of sufficient precipitation (usually rain) can lead to serious shortage issues. Droughts are commonly of two types: *Agricultural* drought inflicts harm on crops and livestock. *Hydrological* drought is characterized by a depletion of groundwater supplies, reductions in stream flow and lowered lake and reservoir levels.

These events may involve geographical areas ranging from a region of the U.S. to sectors of a state or counties. Drought conditions may affect both rural and urban areas with extensive socio-economic consequences. A growing population, with individual and communal demands upon water supplies, coupled with industrial and agricultural uses, will combine to affect water use during both normal and drought conditions. An estimated five million residents rely upon ground water sources and an additional two million depend upon private wells for their daily water supply.

Drought is measured by the *Palmer Drought Severity Index* (PDSI). The Ohio Drought Plan (1988) describes in detail the use of the PDSI, which employs 11 index ranges. These ranges extend from "Extremely Wet" (Index of + 4.00) through near normal conditions to the "Extreme Drought" rating (Index of – 4.00 or less).
Although Ohio's droughts usually occur in the summer, they could continue through the year, leading to an absence of water for plant or animal survival. Winter droughts also occur if frozen ground prohibits the recharging of groundwater or if water supplies are already reduced.

The more common summer droughts, usually accompanied by extreme heat, can lead to outages of electric power due increased air conditioning usage accompanied by a high demand for water. Seasonal droughts may also adversely affect farm produce costs. The famous mid-western ("Dust Bowl") drought of the 1930's cost the state some $58 million ($250 million in current dollars). Losses can, however, be reduced somewhat by adequate mitigation and preparedness actions.

Droughts can also be the cause of water shortages. This may occur as a result of a drought; contamination of water sources; or an inadequate water delivery system. A shortage of this type is considered low risk and could occur but would not likely be county-wide. The estimated population at risk for a water shortage is 1,500 to 75,000.

Drought/Heat waves create a particular concern for the elderly, those with breathing problems and small children. Health hazards related to extreme heat include sunburns, heat cramps, heat exhaustion, and heat stroke. In August of 1995, thirty-two northern Ohio counties, including Stark County, reported thirteen deaths and fifty-two injuries due to drought conditions. (See Figure 2)

The estimated population at risk is 85,000.

Dam Failures

Dam Failure (Hazard Rating = **19**) is defined as a gradual or immediate collapse or failure of water impounding systems or structures, resulting in downstream damages.

Dams in Ohio have been divided into four classes;

CLASS I	• Larger dams whose failure would result in probable loss of life.
CLASS II	• Dams whose failure would result in flooding of high-value property and damage to public infrastructure such as water supply and roads with no probable loss of life.
CLASS III	• Smaller dams whose failure impacts are limited to rural buildings and local roads with no probable loss of life.
CLASS IV	• Dams less than 25 feet high that impound less than 50 acre-feet and whose failure would be restricted to the dam itself and rural lands. Class IV dams are not actively regulated by the division and owners do not pay an annual fee.

Source: Ohio Department of Natural Resources Dam Safety Report 2009

Stark County has four Class I Dams. Meadow Lake Dam is located in Nimishillen Township; Lake Cable Dam and Suarez Lake Dams are located in Jackson Township; Sippo Creek Reservoir Dam is located in Perry Township (which were constructed for recreational purposes); and Dale Walborn Reservoir Dams in Lexington Township (along with Deer Creek Reservoir Dam, Class II) is for public water supplies for the City of Alliance.

There are thirteen Class II, nineteen Class III and twenty-seven Class IV Dams in Stark County. The other ninety dams located in Stark County are classified as Exempt, Abandoned, Unclassified or Non-applicable.

There has not been any information obtained indicating that the dams in Stark County have failed. The estimated population as risk in the event of a dam failure is between 55,000 and 65,000.

Earthquakes/Seismic Activity

Earthquakes (Hazard Rating = **19**) are defined as a rapid motion of the ground accompanied by shaking, faulting (surface and subsurface) and ground failure. Earthquakes from two points affect Ohio: events having epicenters within the state, and those occurring along the New Madrid, Missouri Fault.

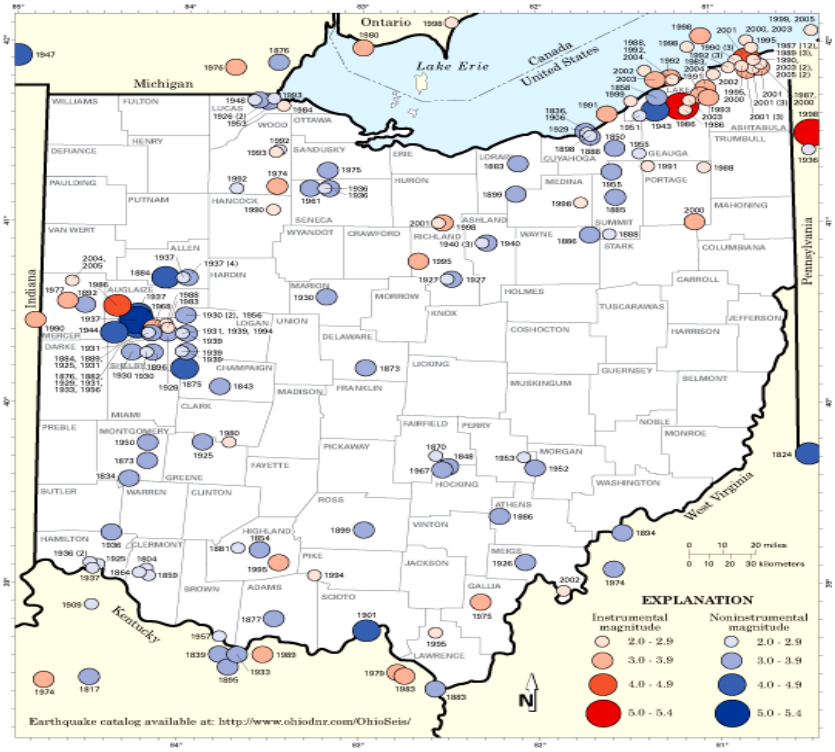
Stark County has two defined faults in which earthquake activity could result. One fault is in the far north central part of the county near Limaville. The other is in the northwest part of the county near the Stark-Summit County line near Akron-Canton Airport. The most recent quake felt in Stark County was June 23rd, 2010 at 13:45 EDT out of Toronto, Canada. No damage was reported although many people were alarmed by the earthquake. The event was felt throughout an area of about 3,000 square miles and had a magnitude of 5.0 on the Richter Scale. Stark County felt earthquakes in March of 2007 (3.3 magnitude), January of 1996 (5.0 magnitude), and June of 1987 (5.0 magnitude).

Stark County may also be affected by events generated by the New Madrid Fault, extending from Arkansas to Indiana along the Mississippi and Ohio River Valleys. This fault generated the most powerful earthquakes ever documented in the Continental US in a four-month period during 1811 and 1812. If earthquakes of this intensity occur again, devastating damages in our southwestern counties could be expected.

Collateral effects from an earthquake could be extensive and may include hazardous material spills, landslides, subsidence, dam failures, fires, groundwater contamination, pipeline breaks, infrastructure disruptions, epidemics, floods, along with theft/looting.

The estimated population at risk is 151,000. See Figure 9 and 10 below.

Figure 9: Earthquake Epicenters in Ohio and Adjacent Areas



Source: Earthquake Catalog at http://www.ohiodnr.com/OhioSeis/

Figure 10: Effects of a Major New Madrid Earthquake in Ohio

MERCALLI INTENSITY	EFFECTS	COUNTIES POTENTIALLY AFFECTED
VI	Felt by all, indoors & outdoors. Many people frightened and excited. Liquids set in strong motion. With slight damage in poorly-built structures. Fallen & cracked plaster with a considerable quantity of broken dishes & glassware.	Allen, Ashland, Auglaize, Crawford, Cuyahoga, Defiance, Erie, Geauga, Hancock, Hardin, Henry, Huron, Lake, Logan, Lorain, Mahoning, Marion, Medina, Mercer, Morrow, Ottawa, Paulding, Portage, Putnam, Richland, Sandusky, Seneca, Shelby, Stark, Summit, Trumbull, Van Wert, Wayne, Wood, & Wyandot. (Approx. 4 million people in 36 counties)
VII	Many people find it difficult to stand. Slight damage in ordinary buildings. Considerable amounts of fallen plaster & numerous broken windows & fallen cornices	Athens, Belmont, Carroll, Champaign, Clark, Columbiana, Coshocton, Darke, Delaware, Franklin, Fulton, Gallia, Guernsey, Harrison, Holmes, Jackson, Jefferson, Knox, Lawrence, Licking, Lucas, Madison, Meigs, Miami, Monroe, Morgan, Noble, Tuscarawas, Union, Washington, and Williams (Approx. 3 million people in 31 counties)
VIII	Alarm approaches panic. Branches of trees broken. Changes in the flow of well & spring water. Considerable damage in ordinary substantial buildings. Fallen walls, factory stacks, towers, & monuments. Heavy furniture overturned.	Adams, Brown, Butler, Clermont, Clinton, Fairfield, Fayette, Greene, Hamilton, Highland, Hocking, Montgomery, Muskingum, Pickaway, Perry, Pike, Preble, Ross, Scioto, Vinton, & Warren (Approx. 3 million people in 21 counties)

Source: *U. S. Geological Survey, Maximum Seismic Interactions Map for New Madrid Seismic Zone; Alger mission & Hopper*

Wildfires

Wildfires (Hazard Rating = **17**) are defined as an uncontrolled fire spreading through vegetative fuels and possibly consuming structures.

The majority of Stark County is in Region 2 of the Ohio Department of Natural Resources Division of Forestry. Region 2 is outside of the Wildlife Protection Area. The very southern section of Stark County falls within the Wildlife Protection Area. This area is considered to be at a higher risk of wildfires due to the abundant grasslands and forest areas.

Weather is the primary factor in wildfires during the fall and spring. The most fires in the Ohio fire control history occurred March 27, 1950, when sixty-five fires were reported and burned 5,900 acres. These fires were due to the extreme drought that year. Another significant year for wildfires in Ohio occurred in 1999 when 1,500 fires burned 7,836 acres of forest.

There have not been any wildfires in Stark County, but several factors that may contribute to the starting of wildfires include arson, equipment fires, campfires and lightning. The estimated population at risk is 58,000.

Technological Hazards

Hazardous Materials

A Hazardous Material (HAZMAT) Incident (Hazard Rating = **27**) is a release of toxic or noxious material at a fixed (factory/storage) site or in an accident involving the transport of those materials (truck, rail, air, or pipeline). These incidents could occur any place in Stark County.

Until the 1970's, events involving materials now classified as "hazardous" received little or no attention. After incidents at Bophal, India and Ravenswood, West .Virginia in the 1980's, Congress enacted the *Superfund Amendment and Reauthorization Act* (SARA Title III), establishing emergency planning and community right-to-know programs. States and counties are now required to integrate HAZMAT response plans into their preparedness programs. In the late 1980's, according to the EPA, this state ranked second in air pollution, third in total toxin releases, and third in the release of carcinogens in the United States.

HAZMAT incidents may occur in any place in Stark County. Incidents involving the shipment and handling of low-level radioactive isotopes have also required state response actions over a period of years. Small haz mat incidents involving the Stark County Hazardous Material Emergency Response Team occur almost monthly.

Primary highways are Interstate 77, U.S. Routes 30 and 62, State Routes 21,43, 172, 183, and 241. There are three railroads in Stark County, two Class I railroads and one Regional, listed respectively: CSX Transportation Inc. (CSXT); Norfolk Southern Corporation (NS); and the Wheeling & Lake Erie Railway Co. These railroads transport raw materials as well as finished products. Passenger transportation is provided by AMTRAK.

The estimated population at risk is 80,000 to 100,000.

Transportation Incidents

Transportation Incidents (Hazard Rating = **25**) include events stemming from both rail traffic and the use of commercial/private aviation not associated with hazardous materials. The potential for fatalities and injuries is high, especially in urban settings.

The use of various modes of transport in daily commerce involves some risk. Ohio has an estimated 7,000 aircraft operating from over 800 private and public airports and commercial passenger or air freight carriers traverse the state on a 24-hour basis. The sheer volume of traffic, along with weather conditions or other factors can increase this risk.

Passenger and cargo airlines continue to cover the state's airspace daily and railway accidents remain a matter of concern in areas of high traffic density. The Akron-Canton Regional Airport is a regional air terminal serving both commercial and military aircraft. The Akron-Canton Regional Airport averages 381 flights per day, including 90 scheduled flights on six carriers daily. The traffic patterns for the Akron-Canton Regional Airport pass over one of the largest shopping complexes in northeastern Ohio as well as business and industrial facilities. The last plane crash associated with Akron-Canton Regional Airport occurred on December 19, 2008, when a single-prop, private aircraft crashed three miles from the runway.

There are also three smaller air fields in the county; Barber Field on the northeast side of the city of Alliance; Yoder Airfield on the northeast side of the city of Louisville; and Beach City Airfield along State Route 212, near the county border with Tuscarawas County. Like other hazards, transportation events may not occur regularly, but authorities in areas with a high density of air or rail traffic should weigh the potential of a transportation emergency.

Once a primary mode for the large-scale transport of passengers and freight, rail carriers experienced a decline from 1950-90. However, freight car loadings, often involving hazardous materials, have increased since 1990 with no less than 31 carriers serving 86 counties over 6,000 miles of track. Although railroad accidents still occur from equipment failures (e.g.: "hot boxes"), collisions with motor vehicles, or problems with aging roadbeds, they have generally decreased due to technological changes in dispatching and traffic control methods.

The estimated population at risk is 500 to 2,500.

Solid Waste Disposal

(Hazard Rating -**23**) The disposal or storage of solid wastes (including used auto tires) has led to HAZMAT related concerns. It is recognized that there is a real fire hazard associated with these sites, which can lead to evacuations from the release of air or waterborne toxins. Further, these sites are potential breeding grounds for disease bearing vectors (mosquitoes and flies).

Stark County's solid waste is disposed of in one of three landfills, two located in Stark County and one in Tuscarawas County. One-hundred-twelve facilities in Stark County report hazardous waste activities; nine-hundred-forty-six facilities report handling hazardous waste; and two sites are on the Superfund National Priority List (NPL). The issue of on-site waste treatment and the removal from these sites poses a unique hazard for adjacent communities. In the event of a problem, local subdivisions (and the state) would be engaged in extensive recovery actions.

Nuclear Attack

Nuclear Attacks (Hazard Rating- 21) are an ever present threat. The reduction of such threats is dependent upon the actions of another country that are unpredictable. As long as there are weapons and the capability of delivering them, the threat will remain. Stark County has been designated at risk from a thermal blast and requiring evacuation to a host area.

Estimated population at risk is 112,000.

Radiological Incidents

Peacetime Radiological Incidents (Hazard Rating = **18**) are defined as the uncontrolled release, misuse, or loss of contained radioactive materials. This is considered to be the second largest technological hazard for Stark County involving one or more of the 1,000 Nuclear Regulatory Commission Licensees in the state.

In addition to fossil fuels, electric power generation now uses nuclear technology. There are no nuclear power plants located in Stark County, however, Stark County is within the 50 mile Emergency Planning Zone (EPZ) for the Beaver Valley Nuclear Power plant in Beaver Valley, Pennsylvania. Stark County is also the very out edge of the planning zone for the Perry Nuclear Power plant in Lake County, Ohio. In addition, unknown quantities of nuclear material pass through Stark County on common carriers.

The estimated population at risk is 160,000.

Department of Energy Facilities

(Hazard Rating = **18**) American Electric Power and First Energy/Ohio Edison provide most of the electric power to the homes and businesses in Stark County. A temporary shutdown of these two companies' facilities would cause a loss of power that could affect the lives and property of county residents. In September 2008, remnants of Hurricane Ike caused nearly sixty percent of the electrical connections to be with power. Natural gas and gasoline shortages could also present a similar problem.

Temporary shutdowns of the energy facilities may be caused by the weather. A winter storm in Stark County in February 2010 caused a power outage for 747 American Electric Power customers in Stark County and 56,000 customers in the state.

Estimated population at risk is 5,000 to 350,000.

Human-Caused Hazards

Civil Disturbances, Riots, and Terrorism

Civil Disturbances

Civil Disturbances (Hazard Rating = **26**), including riots, labor disputes or terrorism, can disrupt civil order and require public safety support in their control or suppression. This hazard could affect the county but would probably be limited to the larger cities (Canton, Massillon and Alliance) and may occur at any time. Past incidents emerged from strikes and public demonstrations.

Although these events are now (1999-2002) infrequent in Stark County, strikes or demonstrations linked to labor or political movements frequently occurred in the 1920's, 30's and 60's. These included Ku Klux Klan actions, coal and steel strikes and Vietnam era disturbances. Many events usually occurred within a few blocks of a campus, industrial site, or neighborhood and did not often expand into the community as a whole. Subsequent legislative or political actions served to "defuse", or reduce, both events and issues. Historically, 31 major urban civil disturbances have been recorded over a 32 year period for Ohio.

The accompanying chart will illustrate some of the major threats, or real events, which have confronted authorities in the state of Ohio in the period 1995-2001.

There are at least three militia groups known in Stark County. See Figure 11 below.

Figure 11: Militia Groups in Stark County

GROUP/ELEMENT	LOCATION
Constitutional Study Group of Canton	Stark
Mahoning Valley Militia	Stark and Trumbull
Ohio Unorganized Militia	Belmont, Brown, Clark, Clermont, Columbiana, Coshocton, Cuyahoga, Delaware, Hamilton, Knox, Licking, Lucas, Marion, Medina, Montgomery, Morgan, & Stark

Source*: Columbus, Ohio Div. of Police, FBI*

While many of these groups/elements claim origins dating from the American Revolution, they often espouse extreme racial or political causes. In addition to "demonstrations", and other activities, they have assumed a

paramilitary guise, affecting uniforms, weapons, and equipment to enhance, or legitimize, their self-appointed status as “militias” or “forces”.

Other loosely-knit organizations, or groups, consist of “Common-Law” movements with an estimated 2,400 members in Ohio. Many of their members also affiliate in some way with the elements cited in Figure 21 or adhere to minor offshoot “cells” of one or two individuals with anti-government and criminal tendencies.

Riots

Stark County has a jail facility is located at 4500 Atlantic Boulevard, in Canton, Ohio. The daily average of prisoners housed at the jail between 1998 and 2001 was 393. An increase in prison inmate populations (33 institutions and 44,000 + inmates with a related incident potential) is a concern for both state and local officials. Significant events, including the 1930 Ohio State Penitentiary fire, the 1952 OSP Halloween fire, the 1968 OSP riot and the 1993 Lucasville riot, were limited to the prisons with minor community impact. Since 1990, eleven critical incidents have occurred at Department of Rehabilitation and Corrections facilities with similar events occurring at Department of Youth Services or county facilities. There are no noted riots staged at the jail during its history.

Terrorism

Terrorist incidents may be of a biological/nuclear, incendiary, chemical or explosive nature and are generally thought to be the work of a terrorist organization. A Terrorism Risk Assessment Committee formed in April 2001 identified activities and sites that a potential terrorist might target in Stark County; this information is on file in the EMA Office.

This combination of events and organizations has made counter terrorism preparedness a priority concern for state and local officials. In 1997, the EMA was instrumental in the formation of a Senior Interagency Coordinating Group (SICG) designed to address counter - terrorism and WMD issues. Additionally, in 1997, federal and state agencies initiated the Domestic Preparedness Program (under the auspices of the *Nunn-Lugar-Dominici Act* of 1996) designed to enhance counter-terrorism readiness in major urban centers, to include six Ohio cities (Akron-Canton, Cleveland, Cincinnati, Columbus, Dayton, Toledo).

The Federal Bureau of Investigation (FBI) defines terrorism as the “…unlawful use of force or violence against persons or property to intimidate, or coerce a government, civilian population, or any segment thereof in the furtherance of political and social objectives”. The victims of terrorism may not always, however, be the intended, or most concerned, elements of society.

From mid-October through late December, 2001, there over 150 suspicious events of Anthrax reported to the Stark County Health Department. The suspected items ranged from letters, packages, fruit, pizza boxes and discarded trash along the roadway. None of the suspicious items contained Anthrax.

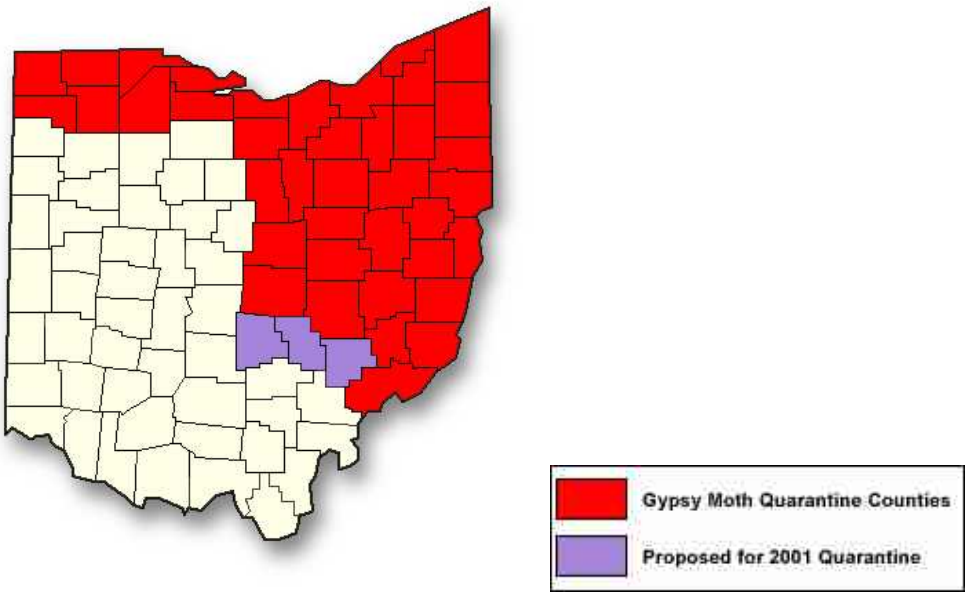
Although events such as the World Trade Center Bombing/Destruction (1993 & 2001) and Oklahoma City bombing (1995) did not occur in Ohio, the threat, real or implied, to employ terrorism in this state, remains. Threats often involved the employment of Weapons of Mass Destruction (WMD), to include bombs and pathogens, and were directed at targets in both rural and urban-industrial settings. In 1995, an Ohio resident with ties to unorganized militias was able to order, via mail, samples of Plague bacilli. Although that attempt was thwarted, the events of 2001 show that the bio-terrorist threat remains viable.

At the time of the 1998 general statewide hazard analysis, terrorism was included under a general hazard “blanket” of Civil Disturbances and related activities. A review of events and incidents, however, may force a reconsideration of the issue, and it could be classed as a separate hazard altogether. Estimated population at risk is 30,000 to 50,000.

Infestations

Infestation (Hazard Rating=**24**) in Stark County is caused primarily by a European strain of the gypsy moth, *Lymantria dispar*, which is one other most destructive defoliating insect pests to attack the trees and forests of northeastern United States. Chapter 901:5-52 of the Ohio Revised Code indicates that certain counties in Ohio may be required to be quarantined to prevent or reduce the spread of this pest to other parts of the state as well as to other states (See Figure 12).

Figure 12: Ohio counties included European Gypsy Moth quarantine



Source: Society of American Foresters

Other infestations that could possibly occur in Stark County include the Asian Cerambycid Beetle, long horned beetles, *Anoplophora glabripennis*, which is also known to attack hardwood trees; and Emerald Ash Borer, *Agrilus Planipennis*, which was identified in Ohio in 2003 is known to live under the bark of a tree.

Abatement programs by appropriate local and state agencies are ongoing to minimize the impact. The estimated population at risk is 59,000.

Epidemics

Epidemics (Hazard Rating = **26**) are contagious diseases which reoccurs in a community and attacks a large number of people at the same time. The potential impacts of an epidemic are illness and/or fatalities, disruption or closing of schools, or forced closure of businesses and industrial operations.

West Nile (Asian tiger mosquito), *Aedes albopictus*, was imported to the United States in 1985 via a load of used truck tires from Japan to Texas although there were no reports of West Nile in Ohio until 1985. There were twelve positive test results of West Nile mosquitoes in Stark County in 2005 and in 2008, the positive results came from a mosquito pool located in Richville Park in Perry Township.

The diseases spread by the West Nile mosquito include Yellow Fever, Dengue Fever, and numerous types of encephalitis.

May 23 and 25, 2001, two West Branch High school students died of Neisseria meningitides and another student, who attended Marlington High School, also was diagnosed with the same strain of meningitides. Students and staff in the area schools (approximately 5,800) opted to get vaccinated against meningitis. The Ohio Department of Health paid for the shots.

H1N1 flu epidemic scare in late-2009 through early 2010 had counties and states across the country preparing for the worst. H1N1 is also known as Swine Flu, is a respiratory disease of pigs caused by Type A influenza virus. It usually occurs in pigs and rarely in humans. The infection is caused by contact with an infected pig or environments which may be contaminated with swine flu virus or contact with a person who is infected with the virus.

Estimated population at risk is 175,000.

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